WHAT IS CLAIMED IS:

1. A method of collecting nanoparticles using a cyclone, said method comprising a process of passing a nanoparticle flow through the cyclone in such a way that the nanoparticle flow has a pressure smaller than 20 torr in the course of passing through the cyclone.

2. The method as defined in claim 1, wherein the cyclone is an axial flow helical cyclone comprising a chamber and a whirling mechanism, said chamber being provided with an entrance for admitting the nanoparticle flow into the cyclone, and an exit for discharging the nanoparticle flow from the cyclone, said whirling mechanism being located in said chamber in such a manner that said whirling mechanism is located between said entrance and said exit of said chamber, and that said whirling mechanism and an inner wall of said chamber form a passage for the nanoparticle flow to pass through while the nanoparticle flow is caused to whirl, so that nanoparticles entrained in the nanoparticle flow are acted on by a centrifugal force to collide with the inner wall of said chamber.

3. The method as defined in claim 2, wherein said whirling mechanism comprises a cylindrical body; and a continuous spiral guide wing piece or a plurality of segmented spiral guide wing pieces disposed on an outer surface of said cylindrical body and circumventing an axis of said cylindrical body; wherein said passage is defined by said spiral guide wing piece or pieces, the outer surface of said cylindrical body and the inner wall of said chamber contiguous to said spiral guide wing piece or pieces.

4. The method as defined in claim 3, wherein said cyclone has an cut-off aerodynamic diameter (d_{pa50}) ranging from 10 to 200nm.

5. The method as defined in claim 3, wherein said cyclone has a theoretical cut-off aerodynamic diameter in the range of 1-100nm, which is computed by an equation as follow:

$$d_{pa50} = 0.106\left(\frac{P_{cyc}}{P_{760}}\right)^2 \frac{\mu(r_{\max}^2 - r_{\min}^2)^2 (P - N\ w)}{\rho_{po}\ n\ \zeta\ Q_0\ r_{\min}^2\ N^2\ \lambda_o}$$

in which P_{cyc} stands for pressure, expressed in unit of torr, in the interior of the cyclone; P_{760}, 760 torr; Q_o, flow rate of the nanoparticle flow under normal pressure and temperature; λ_o, mean free path of air molecule under normal pressure and temperature; μ, viscosity of gas of the nanoparticle flow; r_{max}, maximum radius of the guide wing piece; r_{min}, minimum radius of the guide wing piece; P, interval of guide wing pieces; N, number of the guide wing pieces; w, thickness of the guide wing piece; ρ_{po}, nanoparticle density; n, loop number of the guide wing piece; ζ a fitting constant enabling the theoretical efficiency to conform with the experimental data disclosed in the research literatures.

6. A method of making an axial flow helical cyclone for use in collecting nanoparticles, said axial flow helical cyclone comprising a chamber and a whirling mechanism, said chamber being provided with an entrance for admitting a flow entraining the nanoparticles into the cyclone, and an exit for discharging the flow from the cyclone, said whirling

mechanism being located in said chamber such that said whirling mechanism is located between said entrance and said exit, said whirling mechanism comprising a cylindrical body and a continuous spiral guide wing piece or a plurality of segmented spiral guide wing pieces disposed on an outer surface of said cylindrical body and circumventing an axis of said cylindrical body, wherein a passage is defined by said spiral guide wing piece or pieces, the outer surface of said cylindrical body and an inner wall of said chamber contiguous to said spiral guide wing piece or pieces, said passage being used for the nanoparticle flow to pass through while the nanoparticle flow is caused to whirl, so that nanoparticles entrained in the nanoparticle flow are acted on by a centrifugal force to collide with the inner wall of said chamber, wherein said method comprises making said cyclone so that said cyclone have a theoretical cut-off aerodynamic diameter in the range of 1-100nm, which is computed by an equation as follows:

$$d_{pa50} = 0.106\left(\frac{P_{cyc}}{P_{760}}\right)^2 \frac{\mu(r_{\max}^2 - r_{\min}^2)^2 (P - N\,w)}{\rho_{po}\; n\, \zeta\, Q_0\, r_{\min}^2\, N^2\, \lambda_o},$$

in which P_{cyc} stands for pressure in the interior of the cyclone and is smaller than 20 torr; P_{760}, 760 torr; Q_o, flow of the nanoparticle flow under normal pressure and temperature; λ_o, mean free path of air molecule under normal pressure and temperature; μ, viscosity of gas of the nanoparticle flow; r_{max}, maximum radius of guide wing piece; r_{min}, minimum radius of the guide wing piece; P, pitch of the guide wing pieces; N, number of the guide wing piece; w, thickness of the guide wing piece; ρ_{po}, nanoparticle density; n, loop number of the guide wing piece; ζ, a

fitting constant enabling the theoretical efficiency to conform with the experimental data disclosed in the research literatures.